P444 #1,2,3,4,5,6, 7a,d, 10, 11, 12, 14
446 1,2,3,4,5,6,7.

Review ANS.

p444 1a) $3^4 \times 3^8 \times 3$
$= 3^{13}$

b) $\frac{(-5)^6}{(-5)^4}$
$= (-5)^{6-4}$
$= (-5)^2$

c) $\frac{11^5}{11^9}$
$= 11^{5-9}$
$= 11^{-4}$
$= \frac{1}{11^4}$

d) $((-9)^2)^5$
$= (-9)^{10}$

e) $\frac{4^7 4^5}{4^{12}}$
$= \frac{4^{12}}{4^{12}}$
$= 4^{12-12}$
$= 4^0$
$= 1$

f) $\frac{6^{10}}{(6^6)^2}$
$= \frac{6^{10}}{6^{12}}$
$= 6^{10-12}$
$= 6^{-2}$
$= \frac{1}{6^2}$

2a) $12^{-6} \times 12^8 \times 12^0$
$= 12^{-6+8}$
$= 12^2$

b) $\frac{((-8)^6)^{-2}}{((-8)^{-4})^3}$
$= \frac{(-8)^{-12}}{(-8)^{-12}}$
$= (-8)^{-12-(-12)}$
$= (-8)^0$
$= 1$

c) $\frac{(20^{-1})^8}{20^2 20^6}$
$= \frac{20^{-8}}{20^8}$
$= 20^{-8-8}$
$= 20^{-16}$
$= \frac{1}{20^{16}}$

d) $(10(10^3)^{-1})^{-2}$
$= (10^1(10^{-3}))^{-2}$
$= (10^{-2})^{-2}$
$= 10^4$

3a) $\frac{a^5}{a^3}$

$= a^{5-3}$

$= a^2$

b) $(b)(b^4)(b^2)$

$= b^{1+4+2}$

$= b^7$

c) $\frac{c^3}{c^9}$

$= c^{3-9}$

$= c^{-6}$

$= \frac{1}{c^6}$

d) $(d^6)^3$

$= d^{18}$

e) $\frac{e(e^5)}{e^7}$

$= \frac{e^6}{e^7}$

$= e^{6-7}$

$= e^{-1}$

$= \frac{1}{e^1}$

f) $(f^{-3})^{-2}$

$= f^6$

4

Exponental Form	Radical Form	Evaluation of Expression
$36^{1/2}$	$\sqrt[2]{36^1}$	6
$16^{\frac{5}{4}}$	$\sqrt[4]{16^5}$	32
$1024^{\frac{1}{5}}$	$\sqrt[5]{1024}$	4
$16807^{0.2}$	$\sqrt[10]{16807^2}$	7
$-216^{\frac{4}{3}}$	$\sqrt[3]{-216^4}$	-1296

$16807^{2/10}$ → $16807^{0.2}$

5a) $125^{0.33}$
$= 4.92$

b) $\sqrt[3]{-1953.125}$
$= -12.50$

c) $\sqrt[7]{-180}$
$= 2.10$

d) $16^{\frac{2}{3}}$
$= \sqrt[3]{16^2}$
$= 6.35$

e) $10^{-\frac{3}{2}}$
$= \frac{1}{10^{\frac{3}{2}}}$
$= \frac{1}{\sqrt{10^3}}$
$= 0.03$

f) $\frac{6^{10}}{(6^6)^2}$
$= \frac{6^{10}}{6^{12}}$
$= 6^{10-12}$
$= 6^{-2}$
$= \frac{1}{6^2}$
$= 0.03$

6a) $-125^{\frac{1}{3}}$
$= \sqrt[3]{-125}$
$= -5$

b) $81^{0.25}$
$= 81^{\frac{1}{4}}$
$= \sqrt[4]{81}$
$= \sqrt{9}$
$= 3$

c) $\sqrt[3]{27}$
$= 3$

d) $16^{\frac{3}{2}}$
$= \sqrt{16^3}$
$= \sqrt{16} \cdot \sqrt{16} \cdot \sqrt{16}$
$= 4 \cdot 4 \cdot 4$
$= 64$

e) $256^{-\frac{5}{4}}$
$= \frac{1}{256^{\frac{5}{4}}}$
$= \frac{1}{\sqrt[4]{256^5}}$

7a)

x	y	1st	2nd
1	-1	—	—
2	3	3-(-1)=4	—
3	9	9-(3)=6	6-4=2
4	17	17-(9)=8	8-6=2
5	27	27-(17)=10	10-8=2
6	39	39-(27)=12	12-10=2

2nd differences constant
"Quadratic"

d)

x	y	1st	2nd
-2	10	—	—
-1	30	30-10=20	—
0	90	90-30=60	60-20=40
1	270	270-90=180	180-40=120
2	810	810-270=540	540-180=360
3	2430	2430-810=1620	1620-540=1080

Multiplication pattern "x3"
Exponential

#10 a) $f(t) = 2500(1+0.05)^t$
$= 2500(1.05)^t$

b) $f(t) = 750(1+0.02)^t$
$= 750(1.02)^t$

c) $f(t) = 2500(1.05)^{10}$
$= 4072.24$

∴ the coins will have a value of $4072.24 after 10 years

$f(t) = 750(1.02)^{10}$
$= 914.25$

∴ there will be 914 students in 10 years.

#11 a) $V(t) = 500(1+0.07)^t$

500: initial value in year 2000

0.07: appreciation rate.

b) $V(t) = 500(1+0.07)^{20}$
$= 1934.84$

∴ it will be worth $1934.84 in year 2020.

c) $\frac{1000}{500} = \frac{500(1.07)^t}{500}$

$2 = (1.07)^t$ Guess and check

$t \doteq 10.3$

$= (1.07)^{10.3}$
$= 2.007$

∴ about 10 years & 3 months.

12. $I(n) = 100(0.94)^n$

a) I is the intensity of light per metre of depth

100 is the percentage of light at the surface

0.94 is $(1 - 0.06)$ so light percentage is decreasing at a rate of 6% per metre.

n = depth in metres

b) $I(n) = 100(0.94)^{16}$

$= 37\%$

#14 a) $f(t) = 500(1 + 0.05)^t$

$= 500(1.05)^t$

b) $= 500(1.05)^3$

$= 578.81$

∴ Jerry will have $578.81 after 3 years.

c) ∴ Jerry earned $78.81.

d) $\frac{1000}{500} = \frac{500(1.05)^t}{500}$

$2 = (1.05)^t$

$2 = (1.05)^6$

$2 \neq 1.34$

∴ Jerry is wrong.

p446 # 1 to 7

1a) 5^{-3}

$= \frac{1}{5^3}$

$= \frac{1}{125}$

b) $\left(\frac{3}{4}\right)^{-2}$

$\left(\frac{4}{3}\right)^{2}$

$= \frac{16}{9}$

c) $8^{\frac{1}{3}}$

$= \sqrt[3]{8}$

$= 2$

d) $16^{-0.75}$

$16^{-\frac{3}{4}}$

$= \left(\frac{1}{16}\right)^{\frac{3}{4}}$

$= \sqrt[4]{\left(\frac{1}{16}\right)^3}$

$= \sqrt[4]{\frac{1}{4096}}$

$= \frac{1}{8}$

f) $100^{-\frac{3}{2}}$

$= \left(\frac{1}{100}\right)^{\frac{3}{2}}$

$= \sqrt[2]{\left(\frac{1}{100}\right)^3}$

$= \frac{\sqrt[2]{1^3}}{\sqrt[2]{100^3}}$

$= \frac{1}{1000}$

2a) $(6)^{-\frac{1}{3}} \times (6)^{\frac{5}{6}}$

$= (6)^{-\frac{1}{3}+\frac{5}{6}}$

$= (6)^{-\frac{2}{6}+\frac{5}{6}}$

$= 6^{\frac{3}{6}}$

$= 6^{\frac{1}{2}}$

b) $4\left(\frac{1}{4}\right)^{-4}$

$= 4\left(\frac{4}{1}\right)^{4}$

$= 4 \times 4^4$

$= 4^5$

c) $\frac{10}{10^{-4}}$

$= 10 \div \frac{1}{10^4}$

$= 10 \times 10^4$

$= 10^5$

d) $\frac{7^8}{(7^2)^3}$

$= \frac{7^8}{7^6}$

$= 7^{8-6}$

$= 7^2$

e) $a^7(a^6)^{-2}$

$= a^7(a^{-12})$

$= a^{7+(-12)}$

$= a^{-5}$

$= \frac{1}{a^5}$

f) $\frac{b^3(b^{-2})}{b^4}$

$= \frac{b^{3+(-2)}}{b^4}$

$= \frac{b}{b^4}$

$= b^{1-4}$

$= b^{-3}$

$= \frac{1}{b^3}$

3 $\sqrt[6]{4^3}$

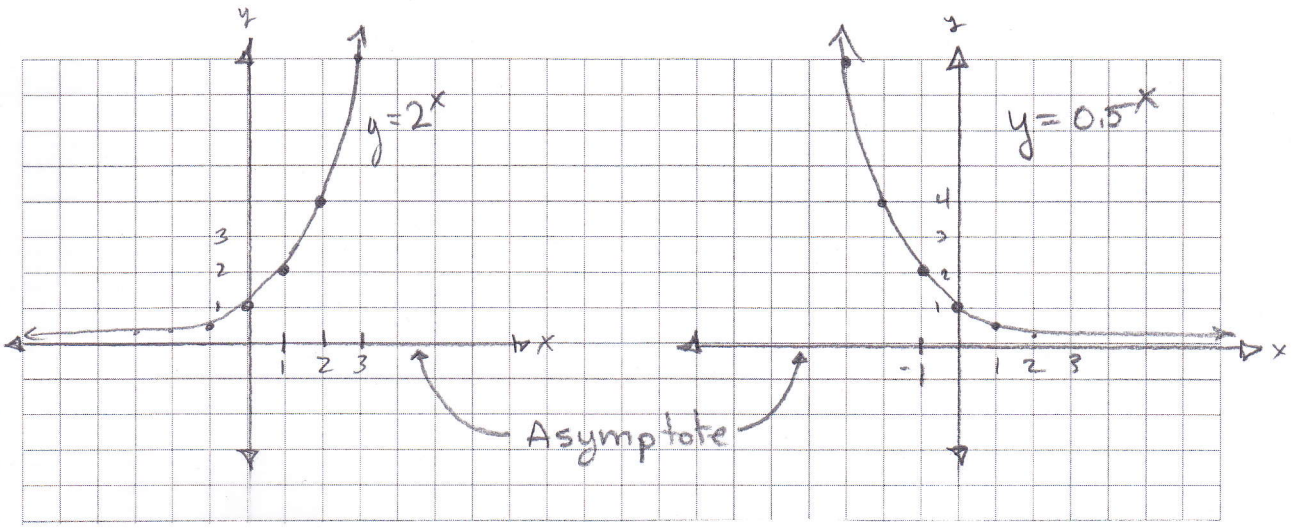
$= 4^{\frac{3}{6}}$ Reduce

$= 4^{\frac{1}{2}}$

$= \sqrt[2]{4^1}$

$= 2$

4.



5a) Car B initial value $ 25 000 - depriciates faster (goes down faster)
Car A initial value $ 20 000

b) Car B depreciates faster so it has a higher depreciation rate.

6 $A(t) = 100\left(\frac{1}{2}\right)^{\frac{t}{5730}}$

$= 100\left(\frac{1}{2}\right)^{\frac{12000}{5730}}$

$= 23\%$ nearest percent

∴ the radioactivity of the bone is 23%.

7a) $P(n) = 1600(1 + 0.015)^n$

OR

$P(n) = 1600(1.015)^n$

b) # of years $= 2008 - 1980$
$= 28$

$P(n) = 1600(1.015)^{28}$
$= 2428$

∴ the population will be 2428 in 2008